LANSCE
Los Alamos Neutron Science Center

Research Proposal for the use of Neutron Science Facilities

☐ **Fast Access** ☐ **Joint CINT Proposal**

Proposal Number: 20111522
Submission Number: S1542
Date Received: 03/09/11

Program Advisory Subcommittee: Materials Science
Focus Area:

Flight Path/Instrument: 1FP05-A / ER1
Estimated Beam Time (days): 57
Days Recommended: 0
Dates Desired: 5 days early in the run cycle, and
Impossible Dates:

TITLE
Neutron radiography experiments at FP-05 in support of the LANSCE NSS2011

☐ Continuation of Proposal #:

☐ Ph.D Thesis for:

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RESEARCH AREA

- ☐ Biological and Life Science
- ☐ Chemistry
- ☐ National Security
- ☐ Earth Sciences
- ☐ Engineering
- ☐ Environmental Sciences
- ☐ Nuc. Physics/chemistry
- ☐ Astrophysics
- ☐ Few Body Physics
- ☐ Fund. Physics
- ☐ Elec. Device Testing
- ☐ Dosimetry/Med/Bio
- ☐ Earth/Space Sciences
- ☐ Materials Properties/Test
- ☐ Other:
- ☐ Mat'l Science (incl Cond Matter)
- ☐ Medical Applications
- ☐ Nuclear Physics
- ☐ Polymers
- ☐ Physics (Excl Condensed Matter)
- ☐ Instrument Development
- ☐ Neutron Physics
- ☐ Fission
- ☐ Reactions
- ☐ Spectroscopy
- ☐ Nuc. Accel. Reactor Eng.
- ☐ Def. Science/Weapons Physics
- ☒ Radiography
- ☐ Threat Reduction/Homeland Sec.
- ☐ Other:

FUNDING AGENCY

- ☐ DOE/BES
- ☐ DOE/OBER
- ☒ DOE/NNSA
- ☐ DOE/NE
- ☐ DOE/SC
- ☐ DOE/Other
- ☐ DOD
- ☐ NSF
- ☐ Industry
- ☐ NASA
- ☐ NIH
- ☐ Foreign:
- ☐ Other US Gov't:
- ☐ Other:

PUBLICATIONS

Publications:

NONE

Abstract: S1542_proposal.pdf

By electronic submission, the Principal Investigator certifies that this information is correct to the best of their knowledge.

Safety and Feasibility Review *(to be completed by LANSCE Instrument Scientist/Responsible)*

☐ **No further safety review required** ☐ **To be reviewed by Experiment Safety Committee**

☐ **Approved by Experiment Safety Committee, Date:**

Recommended # of days:	**Change PAC Subcommittee and/or Focus Area to:**	**Change Instrument to:**

Comments for PAC to consider:

Instrument scientist signature: **Date:**

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Neutron radiography experiments at FP-05 in support of the LANSCE NSS2011

Imaging using neutrons has a long history spanning more than seven decades, though it was only about 40 years ago when it saw a surge in interest [1]. It has evolved into reliable non-destructive testing method, applicable in many different scientific fields and industry. Recent advances in digital image processing along with developments in neutron sources lead to a wide spread deployment of this technique. Unfortunately, the LANSCE user facility lacks a neutron radiography capability as of right now. We are proposing to use the thermal neutron beam available at FP-05 to demonstrate the neutron radiography technique to students attending the Neutron Scattering School 2011 organized by the LANSCE user facility.

Aligned with the theme of this year's summer school is "Neutron Scattering, Energy & Environment" we plan to employ the neutron radiography technique to visualize fluid transport in minerals. We will utilize the available neutron-sensitive image plates as neutron-radiograph detectors. In a series of short exposures we plan to demonstrate variance of the neutron absorption cross section for various elements. We plan to illustrate high sensitivity of the neutron radiography to isotope substitution of certain elements. We will also be able to emphasize the differences in contrast with respect to using X-ray radiography.

The LANSCE NSS2011 is scheduled July 12-22, 2011. We need to reserve beam time at FP-05 in the afternoons of July 15-22, 2011 (duration of hands-on activities). In addition to this beam time allocation we need 5 more days of beam time at FP-05 prior July 12, 2011 (preferably early in the run cycle) to test our experimental setup and develop the demonstration experiments.

References:

[1] M. Strobl, I. Manke, N. Kardjilov, A. Hilger, M. Dawson, J. Banhart, J. Phys. D: Appl. Phys. 42 (2009) 243001 (pp21)